REPORT OF THE
COHASSET/PANUKE ENVIRONMENTAL & SOCIO-ECONOMIC
REVIEW COMMISSION

July, 1990

91-01242/

COHASSET/PANUKE
ENVIRONMENTAL & SOCIO-ECONOMIC REVIEW COMMISSION

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July 24, 1990

Mr. Fred Weir
Chairman and Chief Executive Officer
Canada-Nova Scotia Offshore Petroleum Board
6th Floor, T.D. Centre
1791 Barrington Street
Halifax, Nova Scotia
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Dear Mr. Weir:

In accordance with the terms of reference provided to the Cohasset/Panuke Environmental and Socio-economic Review Commission, a Public Review of the proposed Cohasset/Panuke development project has been completed.

As requested, the proponent's Preliminary Development Application has been examined in detail by the Commission and its expert consultants. The Commission encouraged public input to the review, and provided opportunities for all interested parties to examine the Development Application and raise concerns. LASMO addressed these concerns in a subsequent submission to the Commission.

The Commission has examined the environmental, business, employment, community and directly-related socio-economic implications of all phases of the proposed project, and made a number of recommendations.

Based on its review and comments made in many of the briefs, the Commission has concluded that the project will not have serious environmental impacts if the recommendations contained in this report, which is attached, are followed. The industrial and employment opportunities associated with the project will be good for the economy of the Province. With the stipulations contained in the Report, the Commission recommends that the proposed project be permitted to proceed.

Respectfully yours,

J.R. Pat Ellis

J.R. Pat Ellis
Commissioner

COHASSET/PANUKE ENVIRONMENTAL & SOCIO-ECONOMIC REVIEW COMMISSION

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EXECUTIVE SUMMARY

Under Terms of Reference established by the Canada-Nova Scotia Offshore Petroleum Board (CNSOPB), the Commission has conducted a review of the environmental and socio-economic considerations associated with a proposal by LASMO Nova Scotia Limited to develop the petroleum resources of the Cohasset/Panuke oil fields located southwest of Sable Island.

The Preliminary Development Application prepared by the proponent (LASMO) has been reviewed, and during the examination advice has been sought from experienced consultants on specific aspects of the proposal.

Public information sessions were held at seven locations throughout the Province at which LASMO made presentations describing the proposed project, and the application was made available to the public for perusal at a number of sites. The concerns, as expressed in briefs presented at four public hearings and during the review period, have been addressed by the proponent and have been reviewed by the Commission.

The environmental review dealt with releases during development drilling, routine releases during production and the potential for an oil spill. Considerable attention was given to possible interference with fishing activity, the need to establish exclusion zones and a compensation policy by LASMO acceptable to the fishing industry and the CNSOPB. Marine safety, the importance of monitoring procedures, and the preparation of inclusive contingency and environmental protection plans were thoroughly reviewed.

The Commission has examined the socio-economic implications of this proposed project. While modest, in comparison with other proposed offshore developments in Canada, the Cohasset/Panuke project is likely to be the first offshore production in Canada and, as such, will enable renewed and sustained activity within the Nova Scotia offshore services and supply sector.

The project can be accommodated within the local economy without triggering any local inflationary effects. The exploratory drilling undertaken in the early 1980's, with assistance under the PIP program, created new capacity which is not now being fully utilized and the project demands can be easily absorbed without any supply disruptions.

The interest evidenced at the information sessions with regard to employment opportunities, by experienced seamen and drilling rig workers, confirms there will not be a need to set up additional training facilities, apart from those LASMO will put in place under the safety program.

In its Industrial and Employment Benefits Plan, LASMO has outlined its commitment to maximizing the employment and other opportunities for Canadians and particularly residents of Nova Scotia. The Commission believes the project will be a "shot in the arm" for the Nova Scotia economy, even though it is not large enough to permit LASMO to segregate its efforts to more than one location.

The Commission report contains a number of recommendations based on its review and the concerns addressed in the briefs presented during the public review. The report concludes with the Commission's belief that, from an environmental point of view, the project can proceed without serious environmental impacts if the recommendations put forward are adopted.

1.0 THE REVIEW PROCESS

1.1 Introduction

This report has been produced by the Cohasset/Panuke Environmental and Socio-economic Review Commission under its mandate as established by the Canada-Nova Scotia Offshore Petroleum Board (CNSOPB).

The contents of the report are based on a thorough examination of the environmental and socio-economic implications of the proponent's Preliminary Development Application by the Commission and its consultants, and public input which was forthcoming during the public review period.

The report has been prepared for consideration by the Board in its determination of the terms and conditions under which the proponent may be granted permission to proceed with the proposed project.

1.2 The Commission and its Mandate

Petroleum exploration and development in the Nova Scotia offshore is governed by the Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Acts. The Board is charged with administering these Acts.

Under section 44 of the legislation, the Board may order a public review of proposals to explore for or develop petroleum resources in the Nova Scotia offshore.

The Cohasset/Panuke Environmental and Socio-economic Review Commission was appointed by the Board on February 6, 1990, with Mr. James R. Pat Ellis as Commissioner. The Commission was given a mandate by the Board to conduct an independent public review of the environmental and socio-economic implications

of LASMO Nova Scotia Limited's Preliminary Development Application to produce oil from the Cohasset and Panuke fields southwest of Sable Island, and to make recommendations as to whether the project should proceed as proposed, proceed with modifications, or not proceed at all. The Commissioner was also given authority to offer advice to the Board as to whether the proponent's statements and plans were in any way deficient of information.

In accordance with his mandate, the Commissioner's review has included environmental and socio-economic matters associated with all phases of the project including construction/development, production and abandonment. It has also included the environmental and socio-economic impacts of production and transportation systems and major ancillary facilities.

Specifically, the Commissioner was mandated to address:

* The potential effects of the project on the coastal marine environments and the uses thereof;

* The potential effects of the marine environment on the development project;

* The major employment, industrial, community and directly related socio-economic effects expected to result from the project; and

* The significance of these predicted environmental and socio-economic effects and the measures to mitigate those that are negative and optimize those that are positive.

The Commissioner's mandate did not include examination of policy matters such as those related to energy, jurisdiction, the fiscal and management regime and the division of revenues between governments.

To assist him with his work, the Commissioner retained the services of Dr. Owen Washburn, as Executive Secretary of the Commission, and Mr. Edward Larsen, as Information Officer. Expert opinions on specific aspects of the Preliminary Development Application were solicited from Dr. Ian McLaren, Biology Department, Dalhousie University, Mr. Laurie Davidson, Seaconsult Limited, St. John's, Newfoundland, and Professor Edgar Gold, Director, Oceans Institute of Canada, Dalhousie University.

1.3 Review Procedures

General

The procedures for undertaking the review were developed in response to the Terms of Reference set out by the Board.

Steps in the Review

The proponent (LASMO) provided information on environmental and socio-economic impacts as part of the Preliminary Development Application to the Board. This was reviewed for the scope of coverage and deficiencies were identified which LASMO addressed by revising some portions of the document and issuing addenda.

The documentation was considered sufficiently comprehensive to undertake the public review. The documents were placed on deposit for public examination at the following locations on March 22 to start the 90-day public review period:

Sydney Civic Centre, Sydney
University College of Cape Breton Library, Sydney
Port Hawkesbury Library
Antigonish Library
New Glasgow Library
Halifax City Regional Library
Killam Library, Dalhousie University
Dartmouth Regional Library
Bridgewater Library
Liverpool Library
Yarmouth Library
Ottawa Regional Library

The availability of the documents at these locations was widely advertised in the daily and weekly press throughout the review period.

To ensure that all areas of the province which might be impacted by the project were given the opportunity to hear it explained and voice concerns, the Commissioner, with co-operation from the proponent, conducted seven Public Information Sessions according to the following schedule:

April 9, New Glasgow
April 10, Port Hawkesbury
April 11, Sydney
April 17, Dartmouth
April 18, Yarmouth
April 19, Bridgewater
April 23, Halifax

The information sessions were informal in nature with the Commissioner making opening remarks followed by a presentation by the proponent explaining the proposed development and a question and answer period. The sessions were extensively advertised in the daily and weekly press in advance of the dates.

The public was encouraged to submit briefs or questions to the Commissioner at any time during the review period. Questions requiring clarification of the project or impact assessment material were referred to LASMO.

Based on the level of interest shown at the information sessions, the Commissioner decided to conduct four formal public hearings, with afternoon and evening sessions, according to the following schedule:

June 21, Port Hawkesbury
June 25, Liverpool
June 26, Halifax
June 27, Halifax

These hearings, and the procedures for them, were also widely advertised in the daily and weekly press in advance of the hearing dates. These were formal public hearings with all remarks recorded and transcribed for the public record. A total of 23 briefs and submissions were presented during the public review period.

To reinforce the advertising efforts associated with the Commission's work, a series of news releases were issued to all print and electronic media in the province during the review period which announced each phase of the Commission's work -- the locations where the documents could be viewed, dates and locations for the information sessions and public hearings, and the retention of the experts to examine certain aspects of the Preliminary Development Application.

As well, a mailing list was compiled which included registered fisheries and environmental groups in the province, chambers of commerce and boards of trade, federal, provincial and municipal officials, all news media and others. Two mailings were sent by the Commissioner to those listed. The first announced the formation of the Commission and its mandate, provided notification of the public information sessions and encouraged the submission of written briefs. The second mailing

announced the public hearings and procedures, and again encouraged the submission of written briefs.

The Commission undertook a detailed review of the material submitted by LASMO as well as the submissions from the public and from government agencies. Particular expertise was provided by J.R. Pat Ellis, the Commissioner, in the socio-economic area, and by Dr. Owen Washburn, the Executive Secretary, on the Environmental Impact Assessment (EIA) process and in matters of environmental control. In addition the Commission engaged technical experts in ecology and fisheries (Dr. Ian McLaren), fate of spilled oil (Mr. Laurie Davidson) and tanker safety (Prof. Edgar Gold). Biographical material on all reviewers is appended to the report.

This report is the final step in the Commission's work. It deals with the desirability of proceeding with the project from an environmental and socio-economic point of view, and includes recommendations which should be taken into consideration.

2.0 PROJECT DESCRIPTION

2.1 Project Overview

The Cohasset/Panuke Project is a proposal to develop and produce light oil (condensate) from the Cohasset and Panuke fields, located approximately 41 km west-southwest of Sable Island on the Scotia Shelf (See Figure 1). The two fields are located approximately 8 km apart. The project is to be undertaken jointly (on a 50/50 basis) by LASMO Nova Scotia Limited and Nova Scotia Resources (Ventures) Limited.

Production facilities will be located on a jack-up rig adjacent to the Cohasset site. The oil will then be transferred to a storage tanker moored to a monobuoy. It will then be shipped to market by a shuttle tanker (See Figure 2).

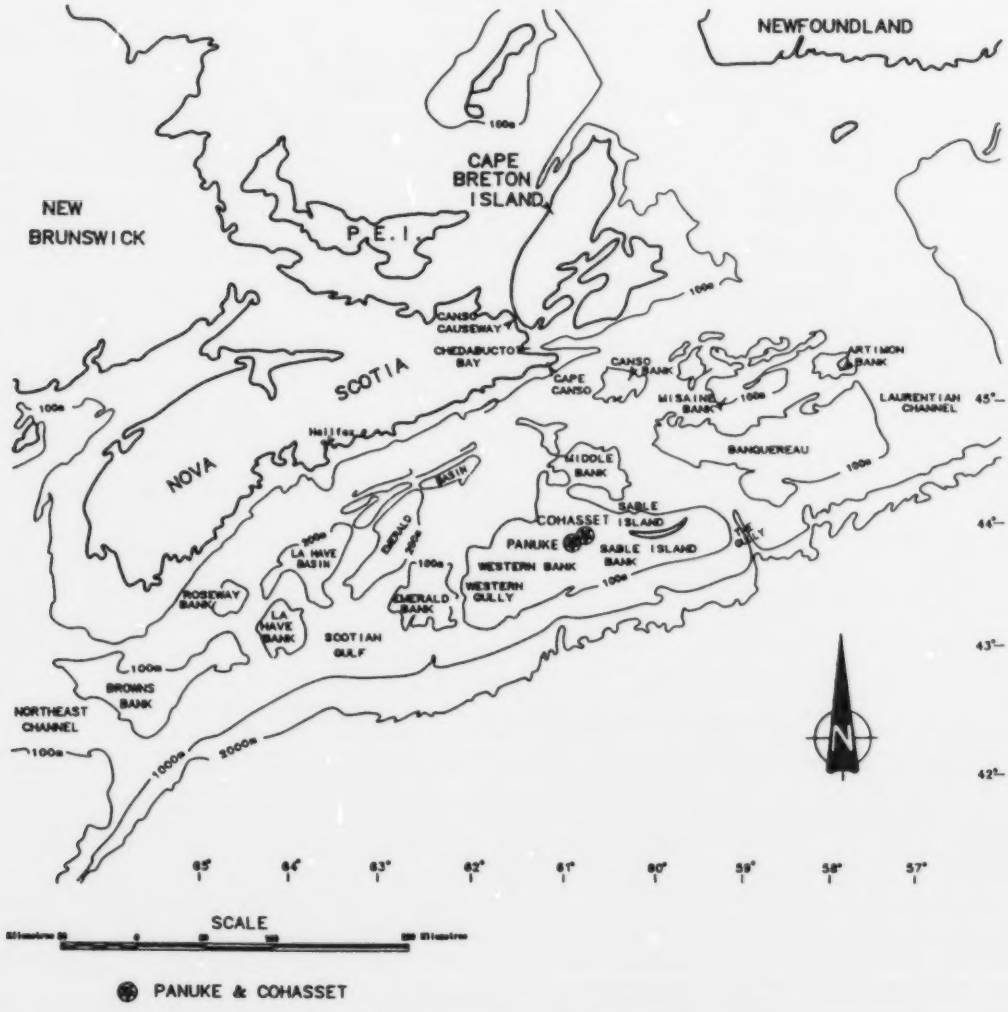
Development drilling will begin in the summer of 1991, with the first production scheduled to take place in the second quarter of 1992. The present plan is to produce condensate during the months of April through October for six years. The production rate is estimated to be 955,000 m^3/year in the early years of the development and will fall to 810,000 m^3/year at year 6. Upon completion of production, the structures will be removed and the wells will be capped and abandoned.

2.2 Drilling and Installation

Wellhead jackets will be fabricated onshore and installed over the two production fields. Drilling will take place using a jack-up rig. The proposal calls for the drilling of five producing wells and two injection wells at the Cohasset site and three producing wells and one injection well at the Panuke site. Except in cases where problems arise which may compromise the integrity of the drilling program, all

Figure 1

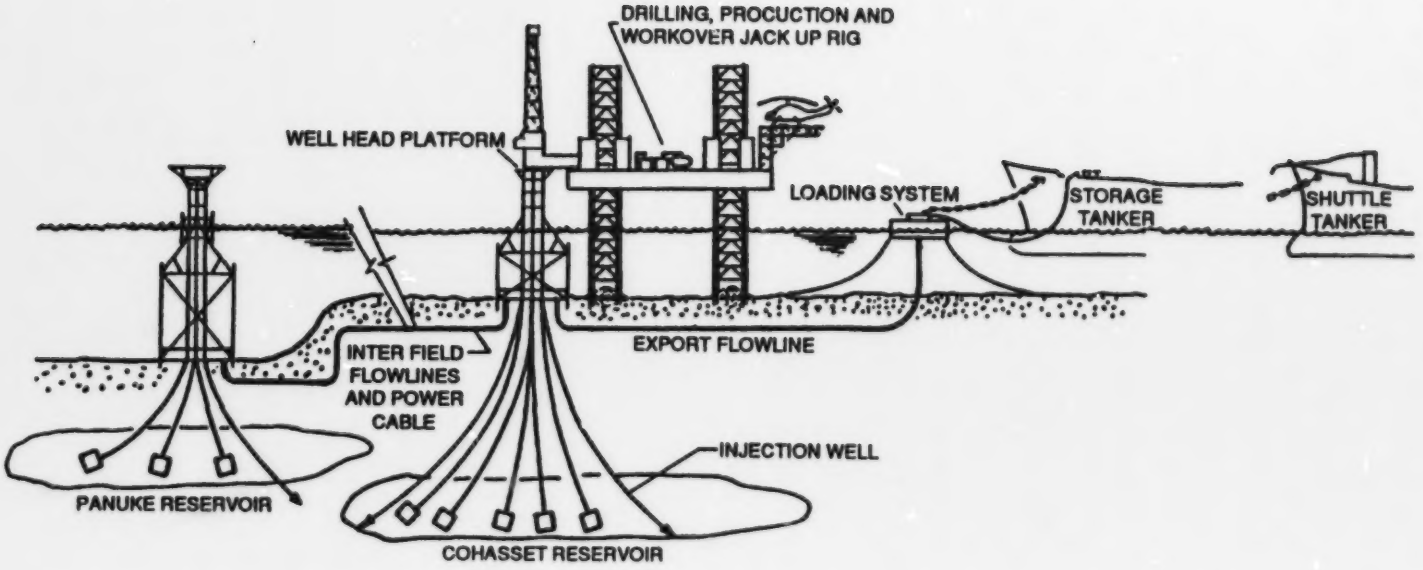
Location of Cohasset / Panuke
Development Project



Source: Canadian Hydrographic Service 1978

PROJECT COMPONENTS

Figure 2



drilling will be carried out using low toxicity, water based muds. Any use of oil based muds will involve low toxicity oils.

2.3 Production Facilities

The jack-up rig will be equipped with production equipment and will be installed over the Cohasset wellhead jacket. The production facilities will include equipment for separating gas and water from the condensate, water injection, produced water disposal and gas flaring. The production facilities will also include the associated control and safety systems. The Panuke wells will be connected to the jack-up rig via a flow line on the sea floor. Produced water will be discharged from the production rig after treatment to meet regulatory standards.

2.4 Oil Transfer and Transportation

The condensate will be transferred from the production rig to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) by a flow line on the sea floor. A storage tanker of 60,000 to 120,000 DWT will be anchored to the CALM buoy and will receive the condensate for transfer to a shuttle tanker. The shuttle tanker will moor to the stern of the storage tanker to load the condensate. It will then transport the condensate to the market destination.

2.5 Land Based Activities

It is anticipated that some of the equipment (e.g. one or two wellhead jackets) may be constructed in Nova Scotian engineering facilities. Other equipment (e.g. the CALM buoy) will have to be sourced offshore. There will be a supply base established to serve throughout the project's life. It appears that the supply base will be located in an existing industrial park facility in the Dartmouth/Halifax area.

2.6 Project Expenditures and Employment

The direct project capital expenditures are projected to be $160 million ($1989) over a five-year period. The total estimated operating expenditures are estimated to be $405 million ($1989). It is estimated that 38 percent of the capital expenditures and 34 percent of the operating expenditures will occur in Nova Scotia.

The direct, indirect and induced employment over the life of the project (1989-1997) is estimated to average 368 persons per year. The direct employment is expected to be 715 person years during the development phase and an average of 260 persons per year during the production phase.

3.0 DISCUSSION OF ISSUES

In considering the environmental and socio-economic issues associated with the proposed project, the Commission had available the extensive information base provided by LASMO in the Preliminary Development Application, including its appendices and addenda. This was supplemented by briefs presented at the public hearings and supplementary information supplied by LASMO in response to briefs and questions. After review by the Commission and its technical experts, this information base was judged to be sufficiently complete to allow the Commission to fulfil its mandate. Furthermore, the review found the conclusions drawn in the Preliminary Development Application to be generally correct and well supported. In some instances more detail was sought and received. Our recommendations reflect further instances where subsequent approvals must be supported by more detailed information.

It is noted that many issues must receive Board approval at subsequent stages of the development of the project, and that final approval of some items, for example contingency plans, must be made at a time when more design details of the project have been completed. The Commission recognizes this fact and has directed many of its recommendations to the actions which the Board should incorporate when considering approvals at future stages of the project.

In summary, the Commission believes that with the stipulations contained in this report, the project can be undertaken without serious environmental impacts and recommends to the Board that the project be permitted to proceed.

3.1 Releases During Development Drilling

The drilling activity will result in the release of several materials to the marine environment. Most of them will be in low concentrations and be quickly dispersed in the environment. Information presented in the Preliminary Development Application shows that a mound of drill cuttings, approximately 3m in height and extending outward for 100m, would result from the drilling but that it would be dispersed in a few months. The Commission is satisfied that the disposal of cuttings will produce only a local impact which will persist for only one season.

In the Preliminary Development Application, LASMO has committed to using water based drilling muds except when drilling problems may require the use of a low toxicity oil based mud. Diesel oil based muds will not be used under any circumstances. It is also noted that, where possible, muds will be reused (recycled) and that mud bulk dumps are predicted to occur only at the completion of a drilling activity in an area. No oil based muds will be dumped in the marine environment. Under these drilling conditions the Commission is satisfied that no serious impacts should result from the use or disposal of drilling muds.

The existence of subsurface anomalies (shallow gas pockets and boulder beds) was brought to the attention of the Commission at the public hearings. LASMO has subsequently provided information from a recently completed survey that shows that no gas pockets were found at the two proposed drilling sites and that boulders at the Cohasset site are at depths greater than 90m and will not affect the stability of the structures on that site.

3.2 Routine Releases to the Environment During Production

During the production of condensate at the Cohasset site there will be routine releases of gaseous, liquid and solid waste materials. The gaseous releases would

arise from the exhausts from engines and heaters on the rig and the tankers, releases from venting during tanker loading, and from the flare which is used to dispose of gaseous by-products. The release from flaring, which will consist of particulate matter and unburned hydrocarbon by-products has been estimated by the proponent to be less than 85 x 10^3 m^3/d. The Commission is satisfied that these emissions will be quickly dispersed and will not cause serious environmental impacts.

LASMO has estimated that up to 5 m^3/d of solid wastes will be generated during the production operations. It is noted that LASMO has committed to transporting all solid wastes to shore for disposal in an approved site.

There are several sources of liquid discharges from the production operation. These include chronic oil discharges, possible release of produced water, oily discharges from deck washing and bilge water and the release of sanitary sewage. LASMO has presented information that although small spills and leaks may be expected to occur over the lifetime of the project, they will not result in more than a local impact in the vicinity of the facilities. Washings and bilge water will require treatment before release.

The amount of produced water is expected to vary from year to year. The estimated maximum rate of water production is 6360 m^3/day. In addition to hydrocarbons, the produced water may contain trace amounts of metal ions, additives and suspended solids. LASMO has presented information indicating that operational releases will not have an impact on the fisheries, beyond the localized area around the rig.

Concern with the produced water was expressed in briefs presented before the Commission and it was recommended that, if possible, produced water be reinjected into the formation. Existing guidelines call for produced water to be treated to reduce the content of hydrocarbons to less than 40 mg/L. Information was also presented that new technology (hydrocyclones) are being developed with the

capability of achieving effluent levels much lower than 40 mg/L. An Environmental Code of Practice, recently released by Environment Canada, also recommends that treatment systems for produced water be designed to achieve an effluent hydrocarbon concentration of 25 mg/L or less. In view of the fact that releases to the marine environment should be kept to a minimum, the Commission recommends that:

> **The Board require LASMO to consider the economic and technical feasibility of reinjecting produced water. If reinjection is not feasible, treatment systems capable of achieving effluent levels of less than 25 mg/L should be considered. In no event should the levels of hydrocarbons in produced water be above the regulated limit (40 mg/L on a 30-day average).**

3.3 Oil Spills

The potential for an oil spill and subsequent impacts on Sable Island and marine life was the focus of concern in a number of briefs presented to the Commission. In the Preliminary Development Application, LASMO presented information on the properties of the Cohasset and Panuke condensates and provided the results of computer modelling studies which predict the extent of displacement of both surface and subsurface concentrations of oil.

The data presented show that the oil from the proposed development (condensate) has properties closer to diesel fuel than those of heavy crude oil. This results in several significant differences in the behaviour of condensate in the marine environment and in the ability to effect counter measures in the case of a spill. The condensate has a higher evaporation rate and dispersion rate in the water column, which means that surface slicks will disappear much more quickly than would be the case with a conventional heavy crude oil. The information presented also indicates

that the condensate will not form a stable emulsion. The properties of the condensate also mean that containment devices, such as oil booms, would not be effective.

The results of modelling studies commissioned by LASMO show that the surface slick would disappear within 25 km of the site and would not reach Sable Island. These modelling results are confirmed by the experience with monitoring the behaviour of a condensate oil slick from the Uniake G-72 well in February, 1984. A copy of the report in response to the Uniake G-72 blowout was available for review by the Commission.

Mr. Laurie Davidson, an oil trajectory modelling expert, was retained by the Commission to review the modelling results presented by LASMO. He was concerned that insufficient data were presented to evaluate the results under all possible wind and current conditions. This concern was satisfied when subsequent data were submitted by LASMO and Mr. Davidson now agrees with the finding that the surface slick will not reach Sable Island.

LASMO estimates that, in the unlikely event of a spill of a tanker load of condensate, a subsurface cloud of dispersed oil, covering an area of 300 km^2 to a depth of 10m could be generated and that up to thirty percent of the fish larvae in the area could be killed. Dr. Ian McLaren of Dalhousie University, the Commission's expert consultant on marine ecology, examined the potential impact of such a large spill and has reported that, while the "worst case" mortality could be larger than predicted, the availability of adjacent populations would provide sufficient replacement for the lost larvae; and that there would be no significant long term impact on the fish stocks from even a large spill.

The Commission is satisfied that the probability of a large oil spill is very small, and that in the unlikely event of a large oil spill, no significant environmental impact will occur.

Environment Canada suggested that more conservative parameters be used when evaluating the hazard zone down wind of a spill. The Commission notes that LASMO will use actual conditions at the time of a spill when making decisions relating to the hazard zone that must be respected.

3.4 Interference with Fishing Activity

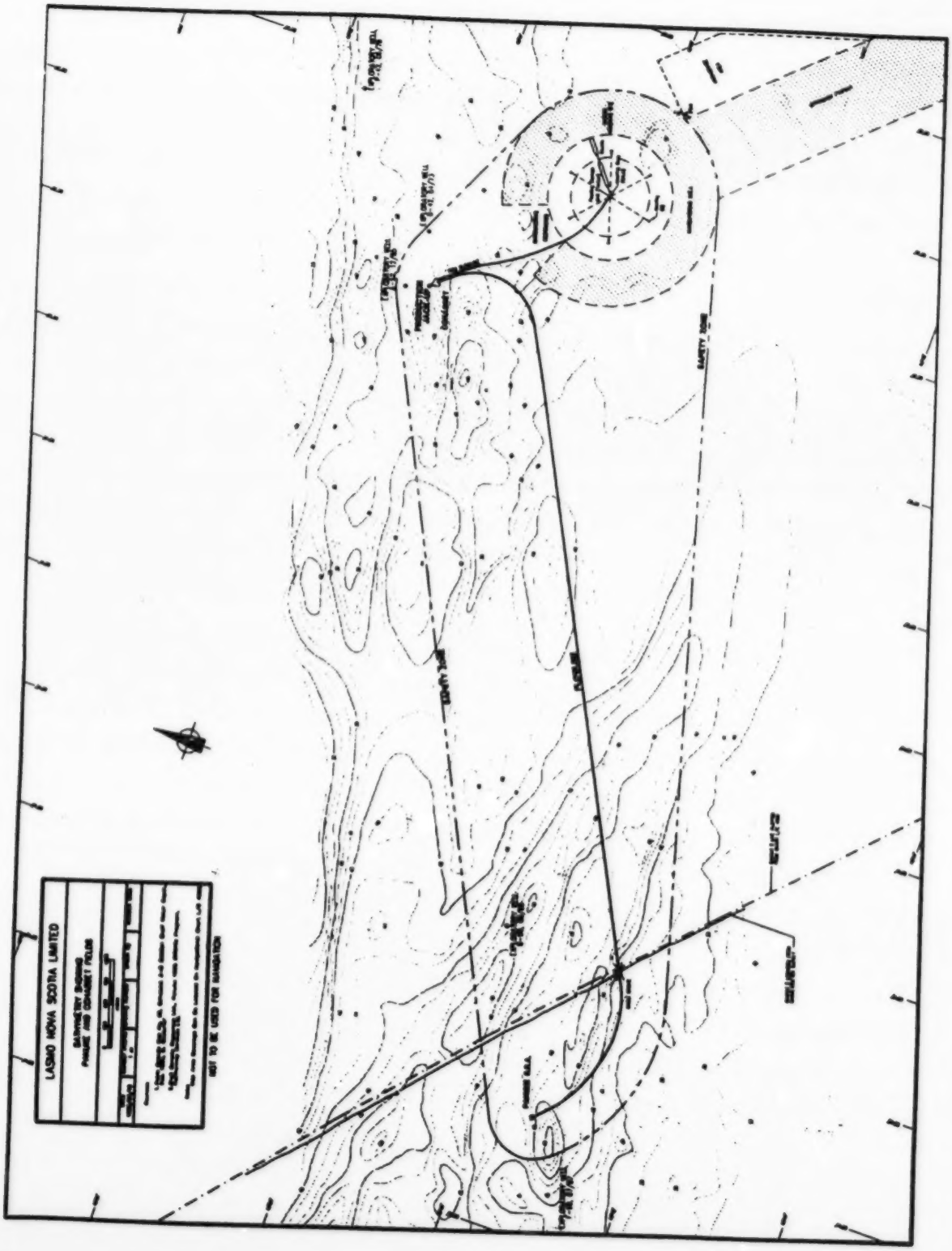
3.4.1 Exclusion Zones

As noted in the Preliminary Development Application, the proponent proposes to establish a safety exclusion zone around the development area to ensure safety of operations (See Figure 3). The proponent has stated that the impact of this exclusion zone on fishing activity will be minimal, and this has been corroborated by fishing industry representatives during the public review. It was further noted that the proposed Cohasset/Panuke exclusion zone partially overlaps an existing exclusion zone for the trans-continental communications cable.

While no objections were raised to the proposed safety exclusion zone throughout the public review, concerns were expressed regarding enforcement and safety.

It was noted that potential conflicts could arise if efforts to enforce the safety zone resulted in the emergence of an unofficial "notification zone". This zone was described as an area three to eight kilometers in diameter beyond the safety zone in which vessels approaching the safety zone would be advised to alter course and not approach closer to the safety exclusion zone.

Figure 3



Incidents of conflict in the past were referred to in which overzealous captains of standby vessels had sought to turn fishing vessels back perhaps too far in advance of their reaching the safety zone.

The Commission acknowledges that the emergence of such an unofficial notification zone could increase the total area which might be expected to impact fishing activities. The lead time available prior to commencement of production provides the opportunity for the proponent and the fishing industry to engage in constructive dialogue to ensure that clear understandings and procedures are in place prior to production. The Commission therefore recommends that:

> **Procedures for notification and enforcement of the safety exclusion zone be worked out between LASMO and the fishing industry, and that these procedures be communicated to fishing vessel captains and captains of supply boats. These procedures should be periodically reviewed to ensure that they are being effectively adhered to.**

Similarly, the Commission recognizes the potential for increased vessel traffic associated with the project to conflict with traditional fishing patterns, possibly resulting in damage or loss of fishing gear. All parties involved have acknowledged that these sorts of situations can be avoided through the establishment of an effective and well developed communications network. The Commission therefore recommends that:

> **LASMO, in consultation with the fishing industry and appropriate government agencies, establish procedures for notifying fishing vessels of all project-related vessel traffic movements and adhere to those procedures throughout the life of the project.**

While the location of the Cohasset and Panuke fields, well away from established shipping lanes, substantially reduces the risk of accidental penetration of the safety zone due to mechanical or human failure, the possibility of such events occurring still exists. Vigilant monitoring, together with established procedures and capability for diverting stray shipping from the safety exclusion zone are essential.

> **The Commission recognizes the need to ensure the continued commitment of on-duty offshore personnel to remain alert to the possibility of stray shipping intruding on the exclusion zone, particularly at night and during adverse weather. The Commission recommends that provision be made for regular review of diversion procedures established in operation guidelines.**

In addition to the above-noted concerns associated with the safety exclusion zone, the Commission heard representation proposing a shuttle tanker exclusion zone around the area known as "The Gully", located approximately 120 kilometers east of the Cohasset and Panuke fields. The Gully is acknowledged to provide habitat for certain species of marine mammals - some of them, such as the Northern Bottlenose Whale, considered endangered. The proponent has responded to this representation in a manner considered acceptable, and the Commission recommends that:

> **The shuttle tanker exclusion zone proposed by LASMO to avoid the area known as "The Gully" be implemented and adhered to; and that LASMO, in consultation with the Board and other government agencies, consider how best to ensure compliance with the zone.**

3.4.2 Compensation

The establishment by the proponent of a compensation policy acceptable to the fishing industry and the Board is an important pre-requisite to gaining Board approval of the project. Development of the compensation package will require extensive negotiation and co-operation between the proponent and representatives of the fishing industry. The compensation plan must be comprehensive, clear and well understood by all concerned. Input to the public review focused on the importance of ensuring that the plan is in place before drilling begins, that it provide specific compensation for pre-emption of fishing activity, tainting and fouling of gear, and that it cover the activities of third parties involved in the project. The Commission therefore recommends that:

LASMO and the fishing industry work together to develop a thorough and mutually acceptable attributable compensation plan prior to commencement of development drilling; that the Board consult with the Department of Fisheries and Oceans (DFO) prior to approving the plan, and that details of the plan be communicated to fishermen.

LASMO's compensation plan clearly set out the conditions under which specific provisions will be made for the granting of compensation for pre-emption of fishing activity, tainting and fouling of gear due to condensate spills, or other eventualities resulting from the project.

The compensation package outline conditions under which provision will be made for losses to fishermen resulting from third parties associated with the project.

3.5 Marine Safety

A number of well prepared briefs addressed the issue of safety at sea and dealt with the importance of having experienced masters and qualified officers and crew, well trained in procedures to cope with mishaps. LASMO has stated its commitment to maximizing the use of qualified Canadian personnel. This will involve the preparation of training and succession plans to ensure that orderly implementation of this committment is consistent with the maintenance of high safety standards.

The proposed use of a CALM buoy installation, to which a 60,000 to 140,000 (dead weight ton) storage tanker will be moored, evoked considerable comment as to the proper procedures to be followed in its use as well as that of the shuttle tanker (40,000 to 80,000 DWT). LASMO's original submission and its responses to concerns raised, indicates its awareness of the need to exercise caution and to have well established guidelines in place before operations begin.

Environment Canada has expressed concern that (1) LASMO's offshore facilities should be designed to withstand 100-year return winds, (2) loading due to atmospheric icing should be re-evaluated, and (3) details of its engineering analysis of flowline/seabed stabilization should be submitted prior to production approval. As all these matters come under the jurisdiction of the Board, they are mentioned here in order to bring them to the Board's attention.

LASMO's proposal to shut down operations during the winter months and when weather conditions dictate, confirms the need for a dedicated site-specific weather forecast, warning and observation service for the Cohasset/Panuke site.

Other issues raised such as (1) the need to have the capacity to maintain a tow line to a loaded dead weight storage tanker in stormy weather, (2) utilization of electronic chart technology on the shuttle tanker and a longer mooring line for use

when approaching the storage tanker, and (3) sufficient support for fire fighting and evacuations on site, received assurances from LASMO that they would be taken into consideration as operating procedures are established. It is noted that the Board has responsibility for ensuring safe operational procedures.

The suggestion that a professional tug of medium power should be available to assist if necessary when mooring the shuttle tanker to the storage tanker or in an emergency situation, brought the reply from LASMO that they were seeking permission to make use of one of their supply vessels especially equipped for this purpose on a limited basis. The proposal warrants consideration.

Several participants in the hearings expressed their concern that LASMO had not fully addressed the issue of double hulled tankers, a requirement they considered essential to the protection of the environment in the event of a major spill.

The Commission sought technical assistance as LASMO questioned the need for double hulls and indicated they are planning to employ a vessel which complies with the highest, presently accepted, international standards in terms of SBT (segregated ballast tanks) located protectively at the ship sides.

Professor Edgar Gold, Director, Oceans Institute of Canada, Dalhousie University, an acknowledged international authority on the subject of shipping, reviewed the relevant issues raised in the briefs. In his report to the Commission he stated: "The argument in favour of double bottoms is that in a stranding or collision, only the outer skin of the vessel will be pierced and the inner skin, which contains the pollutant cargo, will remain intact. However, the main argument against double bottoms, which eventually prevailed, is that they create a very serious risk of explosion, due to possible gas and cargo leakages, and that such spaces are difficult to inspect, ventilate and drain. Obviously, another factor, which has to be considered, is that only soft groundings and glancing collisions could in fact avert

pollution if double bottoms were fitted. In this connection, double bottoms would not have made the slightest difference to some of the most serious tanker accidents such as: AMOCO CADIZ, EXXON VALDEZ, MEGA BORG, KARK 5".

Professor Gold stated that LASMO's proposal to use an SBT tanker complies with the International Convention for the Prevention of Pollution from Ships 1973 as amended in 1978 (MARPOL). It should be noted that these standards would exceed present Canadian standards as Canada has not so far become a signatory to MARPOL. Many Canadian vessels are unable to meet MARPOL standards. He added: "It is hoped that the SBTs fitted on the planned vessel will be fitted with an inerting system or at least some type of warning indicator", and LASMO has indicated that this will be the case. The Commission recommends that:

> **While Canada is not yet a signatory to the 1978 Protocol to the International Convention on the Prevention of Pollution from Ships 1973 (MARPOL 73/78), and many Canadian vessels are unable to meet MARPOL standards, the Board should formally accept LASMO's expressed intention to voluntarily comply with these and other conventions directed to improved tanker safety.**

3.6 Monitoring

The Commission received several briefs on the monitoring of effluents and environmental variables. Concern was expressed that environmental variables that could affect the safety of facilities or operations, for example, winds or currents, be monitored. It is noted that monitoring of these variables is mandatory in order that the proponent meet the requirements of the Board to operate the Cohasset/Panuke development. The proponent must also have in place a compliance monitoring and environmental effects monitoring program. These programs must be approved in

advance by the Board and the proponent must provide results for review on a regular basis.

In presenting their brief to the Commission, organizations representing the fishing industry expressed the desire for involvement in the planning and operation of project monitoring programs. It is the view of the Commission that this project presents an opportunity to establish a basis for co-operation between the fishing and oil industries in the offshore. Every effort should be made to involve the fishing industry in project monitoring in order to provide assurance that protection of the marine environment is a continuing priority. Federal agencies charged with resource management and environmental protection should also have an opportunity to review monitoring programs on an ongoing basis. The Commission recommends that:

> **The Board establish a monitoring advisory committee to advise it on both compliance and environmental effects monitoring issues. The committee should be given an opportunity to review monitoring plans prior to their approval and implementation and regularly review monitoring results. The committee should include a representative from the fishing industry, as well as from DFO, Environment Canada, Energy Mines and Resources (EMR) and other government agencies with resource or regulatory interests in the project.**

Representatives of the fishing industry also expressed the wish to be involved monitoring the day-by-day operation of the proposed project.

The implementation of such a program may be difficult on a location as remote as an offshore production rig. Nonetheless, it is important that all participants in the

development have confidence that the procedures presented by LASMO are adhered to on a day-by-day basis. The Commission recommends that:

> **The Board seek ways to monitor the day-by-day procedures on the production rig that relate to environmental protection.**

3.7 Environmental Planning

3.7.1 Contingency Planning

A contingency plan is a planning document to cope with an emergency situation that could arise from an event such as a major oil spill. In the Preliminary Development Application, LASMO provided the general features of its proposed contingency plan. In replying to recommendations made by DFO, LASMO confirmed that the contingency plan will cover all offshore operations, including rig/storage tanker and storage tanker/shuttle tanker oil transfer operations. The details of their plan will be provided when the project details have been completed.

The plan will require Board approval before drilling or production activities begin. It is the usual practice for other interested government agencies to participate in the review of a contingency plan since resources from many sources will be required in the event of an emergency. The Commission recommends that:

> **In approving a contingency plan, prior to granting permission to undertake drilling or production, the Board provide an opportunity for review and comment by relevant government departments including DFO and Environment Canada.**

Environment Canada raised the concern about the time involved in moving a rig on-site to drill a relief well, should one be required to counter a well blowout. The

Commission agrees that information should be provided on the availability of drilling rigs for relief wells. The Commission recommends that:

> **The contingency plan include procedures to locate and move a rig capable of drilling a relief well to the site should one be required to counter a blowout.**

3.7.2 Environmental Protection Plan

LASMO has presented an outline of an Environmental Protection Plan in the Preliminary Development Application. This plan will contain much of the information that will allow the Board to assess the adequacy of LASMO's environmental protection efforts. The elements of the plan listed in the Preliminary Development Application are: LASMO's operating procedures, regulations and guidelines from the Board, training program, and other applicable regulations and guidelines. The plan will consolidate all environmental mitigation procedures.

The Commission recognizes that the details of the Environmental Protection Plan should be finalized when the project details are complete and discussions have taken place with various resource and regulatory agencies. However, it is important that the plan be in place before any project actions with potential environmental impacts take place. The Commission recommends that:

> **The elements of the Environmental Protection Plan relating to various project activities be approved and in place before approval to proceed with each activity is given.**

The Environmental Protection Plan will be the cornerstone of LASMO's environmental protection program. The Commission recognizes the need to incorporate the views of interested government agencies in the approval and ongoing

review of the plan. Furthermore, representatives of the fishing industry should be given an opportunity to participate in the review of the plan. The Commission recommends that:

> **Prior to approval of an Environmental Protection Plan, the Board establish a consultative process to facilitate the incorporation of the concerns of all relevant government departments, including DFO, Environment Canada and EMR. Discussions should also be undertaken with the fishing industry to establish a mechanism to allow their concerns to be considered before approval of a plan.**

A portion of LASMO's operating plans will form a part of the Environmental Protection Plan. The oil transfer operations represent a significant difference between this development and other recently proposed developments such as Venture. Several briefs raised concerns that operating procedures and responsibilities should be clearly outlined. The Commission concurs with the need for clearly defined procedures and responsibilities, whether they are submitted as part of the Environmental Protection Plan or as separate documentation. The Commission recommends that:

> **Prior to approval to undertake production the Board require LASMO to submit a satisfactory operating plan that specifies:**
>
> - **The environmental limits for oil transfer from the CALM buoy.**
>
> - **Shuttle/storage tanker oil transfer procedures.**

- **The alerting procedures to trigger protective actions under adverse weather conditions. These would include procedures to evacuate the rig under extreme conditions.**

The Commission further recommends that:

The operating procedures clearly indicate the chain of command and identify decision-making responsibilities under normal, alert and emergency conditions.

3.8 Socio-economic Considerations

The project presented by LASMO involves the combined development of two condensate fields located approximately 41 km southwest of Sable Island, with an estimated capital cost of $160 million, and possibly as much as $60 million of this amount spent in Nova Scotia. Annual operating costs during full production (5/6 years) are estimated to be $71.2 million. Of this, $23.4 million is likely to be spent in Nova Scotia, with the balance largely spent on imports; i.e. the lease of drill rig, storage and shuttle tankers. All of the above costs are expressed in 1989 dollars.

It is possible to accommodate a project of this size within the local economy without triggering measurable local inflationary effects. Excess capacity exists in many sectors and the project demands can be easily absorbed without any supply disruptions.

The Commission noted a high level of interest at the information sessions with regard to employment opportunities, by experienced seamen and drilling rig workers. This would indicate that there will not be a need to set up additional training facilities, apart from those LASMO will put in place under the safety program.

The industrial opportunities associated with the project, while considered modest by comparison with other proposed offshore developments in Canada, will enable renewed and sustained activity within the Nova Scotia offshore supply and services sector.

From the information submitted, annual direct employment onshore and offshore during the production phase is estimated to be about 260 in addition to a total of about 715 person years of direct employment during the development phase.

In line with the committment stated in its Industrial and Employment Benefits Plan to maximize employment opportunities for residents of this area, LASMO expressed its intention to make use of the pool of experienced offshore rig workers in Nova Scotia during the development phase, a time when most of the project impacts are onshore. Following the transition from development activities to production offshore, direct employment on offshore facilities and vessels is expected to increase to about 210 (including turn-around crews where appropriate). LASMO has committed to replacing offshore crews with Nova Scotians as quickly as they can be assimilated into the operation.

The supply base and other shore-based services are expected to provide direct employment for about 10 persons during the production phase, and a somewhat larger number during the development phase.

Strong representation has been made to the Commission by the Mulgrave Industrial Commission and the Town of Mulgrave, supported by the Port Hawkesbury Industrial Commission and the Municipality of the County of Richmond, outlining the advantages of the Town of Mulgrave as the location of a supply base for the proposed project.

The brief presented by the Mulgrave Industrial Commission has been well prepared. It documents, in considerable detail, Mulgrave's experience as a supply base for offshore development, and comments on the facilities and infrastructure present in the town and in the immediate area to service an offshore development project.

The socio-economic benefits to Mulgrave in having the supply base located there as compared to a larger centre such as Dartmouth/Halifax were well presented, as was the observation that a project of this nature is viewed as being vital to the community's future.

In response to a question raised during the public review process as to what key factors LASMO, as operators, must take into consideration as they make a decision on the location to be selected for a supply base, Executive Vice-President Norman Miller included the following comments: "We are embarking upon the first production operation offshore in Canada, and our decisions will have to be geared to supporting not a drilling operation as we have done in the past with its supply bases, but to a production operation which is 'different'. A very significant consideration will be the proximity of that base to the people running the facility, which is very dependent on an effective operation, not only offshore but also onshore".

The Commission believes that the project will be a "shot in the arm" for the Nova Scotia economy, even though it is not large enough to permit LASMO to segregate its efforts to more than one location, which is likely to be the Halifax/Dartmouth area.

The Commission believes that the industrial and employment opportunities associated with the project will be good for the economy of the province and recommends that, from a socio-economic perspective, the proposed project should proceed.

Recognizing that for effective overall management as well as for economic reasons, the supply base is likely to be located in the Dartmouth/Halifax area, this does not prevent LASMO from making use of some facilities in Mulgrave. The Commission recommends that in view of Mulgrave's strong representation, the Board encourage LASMO to make use of facilities in Mulgrave wherever feasible.

3.9 Institutional Considerations

The extent of the briefs from several governmental bodies, the number of recommendations put forward, as well as their content, indicated to the Commission that there appears to be a lack of clear understanding as to their working relationship with the Board.

The Commission has endeavoured to include in its report those areas where the concerns expressed along with the Commission's own findings, make it apparent there is a need to ensure that the appropriate action required is not overlooked.

It is customary that Memoranda of Understanding be prepared and agreed to by the interested parties so that the relationships and responsibilities are clearly defined and understood by the parties involved, and this should be done at an early date for this proposed offshore development. The Commission recommends that:

Every effort be made to finalize Memoranda of Understanding between the Board and the appropriate federal and provincial government agencies at an early date so that the relationships and responsibilities are clearly defined and understood by the various parties involved in the proposed offshore development.

4.0 CONCLUSIONS AND RECOMMENDATIONS

1. In summary, the Commission believes that, with the stipulations contained in this report, the project can be undertaken without serious environmental impacts, and recommends to the Board that the project be permitted to proceed. Specifically, the Commission recommends that:

2. The Board require LASMO to consider the economic and technical feasibility of reinjecting produced water. If reinjection is not feasible, treatment systems capable of achieving effluent levels of less than 25 mg/L should be considered. In no event should the levels of hydrocarbons in produced water be above the regulated limit (40 mg/L on a 30-day average).

3. Procedures for notification and enforcement of the safety exclusion zone be worked out between LASMO and the fishing industry, and these procedures be communicated to fishing vessel captains and captains of supply boats. These procedures should be periodically reviewed to ensure that they are being effectively adhered to.

4. LASMO, in consultation with the fishing industry and appropriate government agencies, establish procedures for notifying fishing vessels of all project-related vessel traffic movements and adhere to those procedures throughout the life of the project.

5. The Commission recognizes the need to ensure the continued commitment of on-duty offshore personnel to remain alert to the possibility of stray shipping intruding on the exclusion zone, particularly at night and during adverse weather. The Commission recommends that provision be made for regular review of diversion procedures established in operation guidelines.

6. The shuttle tanker exclusion zone proposed by LASMO to avoid the area known as "The Gully" be implemented and adhered to; and LASMO, in consultation with the Board and other government agencies, consider how best to ensure compliance with the zone.

7. LASMO and the fishing industry work together to develop a thorough and mutually acceptable attributable compensation plan prior to commencement of development drilling; the Board consult with the Department of Fisheries and Oceans prior to approving the plan, and details of the plan be communicated to fishermen.

8. LASMO's compensation plan clearly set out the conditions under which specific provisions will be made for the granting of compensation for pre-emption of fishing activity, tainting and fouling of gear due to condensate spills, or other eventualities resulting from the project.

9. The compensation package outline conditions under which provision will be made for losses to fishermen resulting from third parties associated with the project.

10. While Canada is not yet a signatory to the 1978 Protocol to the International Convention on the Prevention of Pollution from Ships 1973 (MARPOL 73/78), and many Canadian vessels are unable to meet MARPOL standards, the Board should formally accept LASMO's expressed intention to voluntarily comply with these and other conventions directed to improved tanker safety.

11. The Board establish a monitoring advisory committee to advise it on both compliance and environmental effects monitoring issues. The committee should be given an opportunity to review monitoring plans prior to their approval and implementation and regularly review monitoring results. The

committee should include a representative from the fishing industry, as well as from DFO, Environment Canada, EMR and other government agencies with resource or regulatory interests in the project.

12. The Board seek ways to monitor the day-by-day procedures on the production rig that relate to environmental protection.

13. In approving a contingency plan, prior to granting permission to undertake drilling or production, the Board provide an opportunity for review and comment by relevant government departments including DFO and Environment Canada.

14. The contingency plan include procedures to locate and move a rig capable of drilling a relief well to the site should one be required to counter a blowout.

15. The elements of the Environmental Protection Plan relating to various project activities be approved and in place before approval to proceed with each activity is given.

16. Prior to approval of an Environmental Protection Plan, the Board establish a consultative process to facilitate the incorporation of the concerns of all relevant government departments including DFO, Environment Canada and EMR. Discussions should also be undertaken with the fishing industry to establish a mechanism to allow their concerns to be considered before approval of a plan.

17. Prior to approval to undertake production the Board require LASMO to submit a satisfactory operating plan that specifies:

- The environmental limits for oil transfer from the CALM buoy.

- Shuttle/storage tanker oil transfer procedures.
- The alerting procedures to trigger protective actions under adverse weather conditions. These would include procedures to evacuate the rig under extreme conditions.

18. The operating procedures clearly indicate the chain of command and identify decision-making responsibilities under normal, alert and emergency conditions.

19. The Commission believes that the industrial and employment opportunities associated with the project will be good for the economy of the province, and recommends that, from a socio-economic perspective, the proposed project should proceed.

20. Recognizing that for effective overall management as well as for economic reasons, the supply base is likely to be located in the Dartmouth/Halifax area, the Commission notes that this does not prevent LASMO from making use of some facilities in Mulgrave. The Commission therefore recommends that the Board encourage LASMO to make use of facilities in Mulgrave wherever feasible.

21. Every effort be made to finalize Memoranda of Understanding between the Board and the appropriate federal and provincial government agencies at an early date so that the relationships and responsibilities are clearly defined and understood by the various parties involved in the proposed offshore development.

Appendix A

TERMS OF REFERENCE FOR THE COMMISSION

Introduction

The Canada-Nova Scotia Offshore Petroleum Board (the Board) has appointed a Commissioner to conduct a formal environmental and socio-economic review of a proposal to develop the petroleum resources of the Cohasset and Panuke oil fields located southwest of Sable Island. The Commissioner was appointed under the Provisions of the Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Acts.

LASMO Nova Scotia Limited is the operator for the project and, as such, is required to submit to the Board a Preliminary Development Application consisting, in part, of a preliminary development plan, a statement of environmental considerations, a statement of socio-economic considerations, and a preliminary Canada-Nova Scotia benefits plan (the statements and plans). The Board will submit these statements and plans to the Commissioner for distribution to the public.

LASMO is required to prepare the statements and plans in accordance with guidelines issued by the Board.

The Commissioner shall develop his review procedures within the framework described below.

Mandate of Commissioner

The Commissioner's mandate will be to examine the development proposals contained in the proponent's project statements and plans, and in the public

submissions made in response to them. Based upon this examination, the Commissioner will advise the Board about the environmental, business, employment, community and directly related socio-economic implications of the proposed development, and will make recommendations about whether the project should proceed as proposed, proceed with modifications, or not proceed at all. The Commissioner may also offer advice to the Board as to whether the statements and plans submitted are in any way deficient of information.

The mandate of the Commissioner shall not include examination of policy matters such as those related to energy, jurisdiction, the fiscal and management regime and the division of revenues between governments.

In fulfilling his mandate, the Commissioner shall provide an opportunity for public input into his review of the proposed project to ensure that any public concerns about the environmental and socio-economic aspects of the project are taken into account.

Scope of the Commissioner's Review

The review should include environmental and socio-economic matters associated with all phases of the project including construction/development, production and abandonment. It should also include the environmental and socio-economic impacts of production and transportation systems and major ancillary facilities. The principal development alternatives that have received consideration by the proponent are deemed to be part of the review and should be assessed.

Specifically, the Commissioner should address:

* The potential effects of the project on the coastal marine environments and the uses thereof;

* The potential effects of the marine environment on the development project;

* The major employment, industrial, community and directly related socio-economic effects that are expected to result from the project;

* The significance of these predicted environmental and socio-economic effects and the measures to mitigate those that are negative and optimize those that are positive.

Review Process Including Public Information Session(s) and Public Hearing(s)

1. Upon receipt of the proponent's statements and plans from the Board, the Commissioner shall arrange for them to be made available to the public and appropriate government departments and agencies.

2. The Commissioner shall immediately prepare a budget and schedule for the review process, and shall submit them to the Board for approval. The Board will pay for the costs of the review. The Commissioner shall meet with the Board, or its designated representatives, each month in order to update the Board on the progress being made with the review.

3. Concurrently with the distribution of the statements and plans, the Commissioner will conduct a Public Information Session or Sessions at which the proponent will be required, at its own cost, to explain the project and its implications.

   The Session or Sessions will provide the public with an opportunity to identify additional information requirements that may be needed to fully assess the effects of the project. The Commissioner will, during the review period for

the statements and plans, accept written comment from any party, including government agencies.

4. The Commissioner will allow a period of 90 days for review of the statements and plans by interested parties.

5. Subsequently, the Commissioner will conduct a formal Public Hearing(s) to review the environmental and socio-economic implications of the project.

During the public review process, it is intended that Information Session(s) and Public Hearing(s) will be conducted in a nonjudicial but structured manner to permit the orderly examination of information presented to the Commissioner.

The Commissioner will publish detailed procedures for the conduct of the Public Review. In order to enhance the effectiveness and efficiency of the Public Hearing Process, the Commissioner shall encourage the public to provide written submissions prior to the Hearing(s) and to highlight the key points of these submissions at the Hearing(s).

Commissioner's Report

Following his own review and taking into account any concerns raised at the Public Hearings, the Commissioner shall submit a final report of his findings and recommendations to the Board. It is expected that this submission will be made within 160 days following receipt of the proponent's statements and plans from the Board. Copies of the Commissioner's final report shall be made available to the public at the Board's office.

Appendix B

J.R. PAT ELLIS, COMMISSIONER

Born in Sydney, Nova Scotia - August 7, 1920

Entered the Bank of Montreal at Sydney Branch in 1937

Served in Branches, Head Office and Atlantic Regional Departments, and as Branch Manager, Deputy Manager, Montreal Branch and as District Manager in Toronto and Western Ontario before becoming Senior Vice President, Atlantic Provinces Division in 1973. He retired from that position in 1984.

OTHER INVOLVEMENTS:

Member of the Board of the Atlantic Canada Opportunities Agency, and Chairman of The Commercial Projects Review Committee.

He is past Vice Chairman of the Nova Scotia Voluntary Planning Board and a past Chairman of Nova Scotia Venture Capital Corporation, a Provincial Crown Corporation.

Chaired Nova Scotia's First Conference on Offshore Petroleum Development "Opportunities and Challenges", sponsored by Nova Scotia Voluntary Planning Board, January, 1980.

He chaired the Premier's Conference on the Economy which brought together 150 selected delegates from all sectors of the provincial economy for a 2-day think tank.

Vice-Chairman of the Board of Governors, Acadia University, Chairman of the Investment Committee and member of the Executive Committee.

Founding Chairman, Victoria General Hospital Foundation, a position he held for 5 years.

Past President, Nova Scotia District, Canadian Bible Society.

Past Member, Canadian Advisory Board, Marsh & McLennan Limited.

Member of the Halifax Club, Halifax Board of Trade, Ashburn Golf Club, Halifax Curling Club and the Waegwoltic Club.

An active member of the First Congregational Church of Halifax.

Appendix C

BRIEFS AND DOCUMENTS SUBMITTED DURING THE PUBLIC REVIEW PERIOD

1. Port Hawkesbury Industrial Commission - Mr. Steve MacDougall
2. Municipality of the County of Richmond - Warden Madaline Libbus
3. Mulgrave Industrial Commission and the Town of Mulgrave - Mr. George Frear
4. Captain George Hilchie
5. Mr. Noble Smith
6. Dr. William Gillis - MLA, Antigonish
7. Fisheries & Oceans Canada - Mr. Steve MacPhee
8. Atlantic Geoscience Centre - Dr. Carl Amos
9. Environment Canada - Mr. Hugh Hall
10. Dr. Ian McLaren - Biology Department, Dalhousie University (Commission expert)
11. Mr. Laurie Davidson - Seaconsult Limited (Commission expert)
12. Ms. Doreen Curtis
13. Offshore Trade Association of Nova Scotia - Mr. Peter Adagaste
14. Canadian Merchant Service Guild - Mr. Jim Patterson
15. Mr. Allan Stockdale
16. Company of Master Mariners - Captain Robin Curtis
17. Dr. Linda Weilgart - Biology Department, Dalhousie University (For Dr. Hal Whitehead)
18. Brief presented by Mr. Roger Sterling, on behalf of:
    Seafood Producers Association of Nova Scotia
    Atlantic Herring Fishermen's Marketing Co-operative, and
    Nova Scotia Dragger Fishermen's Association
    Also present Mr. Dick Stewart and Ms. Linda DeGrace
19. LASMO Nova Scotia Limited

20. Professor Edgar Gold - Oceans Institute, Dalhousie University (Commission expert)
21. Mr. Alan Ruffman - Geomarine Associates Limited
22. Mr. Dan Campbell - Tusket River Environmental Protection Association
23. Dartmouth Chamber of Commerce - Mr. Roger Perry

Appendix D

BIOGRAPHIES OF TECHNICAL REVIEWERS

PROFESSOR EDGAR GOLD

Professor Gold spent sixteen years in the merchant marine, serving on most types of vessels in world-wide trade. He holds a British foreign-going Master Mariner's certificate and was in command for several years. He obtained his B.A. and LL.B. degrees at Dalhousie University and a Ph.D in international maritime law from the University of Wales. He joined the Faculty of Law, Dalhousie University, in 1975 and became Professor of Maritime Law in 1979. He is cross-appointed as Professor in the School for Resource and Environmental Studies, Faculty of Management Studies, Dalhousie University. He is also Director of the Oceans Institute of Canada, recognized as Canada's principal centre of excellence in the marine affairs area, and has been directly involved with this Institute's predecessors, the Dalhousie Ocean Studies Programme, the Canadian Marine Transportation Centre, and the International Institute for Transportation and Ocean Policy Studies since 1978.

Professor Gold was admitted to the Nova Scotia Bar in 1973 and has been a practicing lawyer since then. He is associated with a prominent Halifax law firm. He has participated in many international ocean-related conferences, including the 3rd U.N. Conference on the Law of the Sea, and has written over 130 books, monographs, articles and papers in his field. He is Senior Vice-President of the Canadian Maritime Law Association, a Titulary Member of the Comité Maritime International, a Member of the Chartered Institute of Transport, an Associate Member of the Chartered Institute of Arbitrators, a Fellow of the Nautical Institute, and numerous other associations.

DR. IAN A. MCLAREN

Dr. McLaren is Professor of Biology at Dalhousie University. He was previously Junior - Associate Scientist, Arctic Station, Fisheries Research Board of Canada, 1954 - 1963; Assistant Professor, Marine Sciences, McGill University, 1963 - 1966, and Associate Professor, Biology, Dalhousie University, 1963 - 1966. He has been a Canada Council Fellow, a member of the Canadian Society of Zoologists, and a Past President and Director of the Canadian Nature Federation. He was a Member of the Committee on Whales and Whaling advising the federal Minister of Fisheries, 1977 - 1980, and Scientific Advisor to federal-provincial review panels on environmental impact statements for the Venture, Hibernia and P.E.I. Fixed Link projects. He served as a Member of the Fisheries and Oceans Advisory Committee for the federal Minister of Fisheries, 1985 - 1989.

Dr. McLaren has carried out research on seals, seabirds, the Sable Island ecosystem and the plankton of the Scotian Shelf, and published articles on his work. He was Canadian Silver Jubilee Medalist, 1977, and Visiting Scholar, Corpus Cristi College, Cambridge, England, 1980 - 1981.

MR. LAURIE W. DAVIDSON

Mr. Davidson is a Physical Oceanographer and President of Seaconsult Limited. He obtained a B.Sc. degree in honours physics from the University of British Columbia in 1973, and an M.Sc. in physical oceanography from that university in 1979.

His project experience has included designing, editing and authoring of the Seychelles National Oil Spill Response Plan; development of statistical models for the seasonal forecasting of sea ice and iceberg conditions, and design and installation of operational forecast systems at the Ice Centre, Environment Canada, Ottawa; preparation of more than 10 marine emergency and oil spill contingency plans, including response plans and environmental background documents for Canadian East Coast operations; environmental coordination of meteorological, oceanographic, ice and forecasting programs for drilling of exploratory wells on northeast Grand banks; analysis and interpretation of bottom water temperature variations on the Scotian Shelf as input to pipeline design; experimental field testing of a high frequency acoustic echo sounder to monitor dispersing oil behaviour during chemical dispersion of an oil slick; project coordinator and editor for comprehensive physical environmental description of the Grand Banks as input to the Hibernia Environmental Impact Statement; design and application of generalized oil spill fate and weathering models; design and application of oil spill trajectory and fate models for in excess of 35 sites off the Canadian east and west coasts; design, implementation, and data analysis of oceanographic field program relating weather, waves, tides, and currents, Strait of Belle Isle, Newfoundland.

He is an associate of the Canadian Meteorological and Oceanographic Society, and a Director of the Centre for Fisheries Innovation.

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DR. OWEN V. WASHBURN

Dr. Washburn served as Executive Secretary of the Commission. He is the Principal of Owen Washburn Associates Limited. He obtained a B.Sc. in Engineering Physics from Queens University in 1961, and a Ph.D. in Chemical Engineering from the University of New Brunswick in 1969.

His experience includes management of a broad range of programs in environmental impact assessment, solid waste management, regulation of toxic substances including pesticides, baseline environmental monitoring, monitoring of industrial air and water effluents and development of treatment systems for industrial wastes.

He was a Member of the CCREM Task force on Toxic Substances, 1979-1980; The Pesticides Advisory Board, Province of New Brunswick, 1978-1980; The CCREM Task Force on Environmental Impact Assessment, 1977-1980, and the New Brunswick Reactor Advisory Safety Committee for the Atomic Energy Control Board of Canada, 1974-1978.

He is a Member of the Association of Professional Engineers of New Brunswick and the Chemical Institute of Canada.

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Draft Development Application Guidelines issued by the Canada-Nova Scotia Offshore Petroleum Board. December 28, 1989.

Cohasset/Panuke Development Project - Preliminary Development Application prepared by LASMO Nova Scotia Limited and Nova Scotia Resources (Ventures) Limited. December 1989.

-- Main Document
-- Appendix I Supporting Documents
-- Appendix II Supporting Documents
-- Addendum - Offshore Tanker Loading Procedures
-- Addendum - Shore Based Facilities
-- Addendum - Air Emissions from Blowouts and Oil Spills
-- Addendum - Countermeasures for Oil Spills

Cohasset/Panuke Development Project Environmental and Socio-economic Summary. LASMO Nova Scotia Limited, March 1990.

Canada-Nova Scotia Industrial and Employment Benefits Plan. LASMO Nova Scotia Limited. June 1990.

Letter of May 1, 1990 from Environment Canada to the Commission requesting additional information on the project.

Letter of May 17, 1990 from LASMO Nova Scotia Limited to the Commission containing information requested by Environment Canada.

Letter of May 22, 1990 to the Commission and June 6, 1990 to Dr. Hal Whitehead from LASMO Nova Scotia Limited responding to concerns about tanker traffic in the Gully.

Letter of May 28, 1990 from LASMO Nova Scotia Limited to the Commission on Well Control Risks and Response.

Letter of June 18, 1990 from LASMO Nova Scotia Limited to the Commission responding to concerns raised by the Atlantic Geoscience Centre.

Letter of June 25, 1990 to Cal Ross from S.L. Ross Environmental Research Limited providing more information on Oil Spill Modelling. Submitted by LASMO Nova Scotia Limited.

Briefs presented at the Public Hearings, including follow-up submissions (see Appendix C).

Transcript of the Public Hearings June 21-27, 1990.

COPAN Public Hearings. June 21-27, 1990. Intervenor Submissions and LASMO responses. LASMO Nova Scotia Limited. June 1990.

Memo of July 13, 1990 from LASMO Nova Scotia Limited to the Commission with information from the Geophysical/Geotechnical Survey Reports.

Letter of July 16, 1990 from LASMO Nova Scotia Limited to the Commission regarding the Decision to Locate the Supply Base in Port of Halifax.

Environmental Code of Practice for Treatment and Disposal of Waste Discharges from Offshore Oil and Gas Operations. Report EPS 1/PN/2, Environment Canada. January 1990.

Offshore Waste Treatment guidelines issued by COGLA and Canada-Newfoundland Offshore Petroleum Board, January 1989.

Report on the Environmental Program Associated with the Blowout at Shell et. al. Uniake G-72. Martec Limited. September 1984.